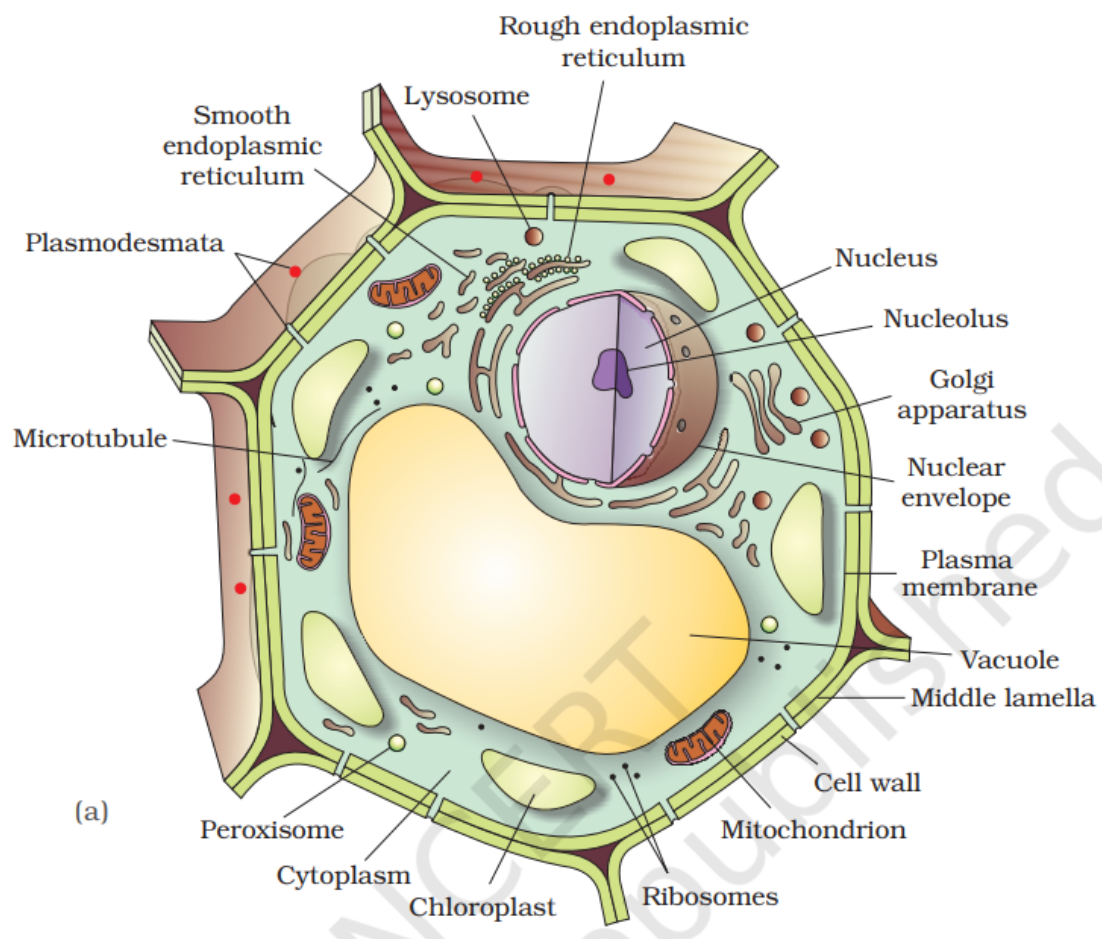


Peroxisome

☰ Content Type	Case Study
☼ Status	Done
☰ Chapter	Cell - The Unit of Life
☰ Course	Graduation NEET
☰ Reference	Cell Biology by Thomas D.Pollard
☰ Subject	Biochemistry Botany Zoology
☰ Topic	Peroxisome
⌚ Ruhul Amin	@February 15, 2023 2:19 PM
☰ Difficulty Level	
☰ Mistake type	
☰ Previous Year Questions	

Key Points

- Peroxisomes are simple organelles with a **single membrane** limiting a lumen containing many oxidative enzymes ,thus catalyze a wide range of oxidation reactions.
- Like mitochondria, peroxisomal enzymes oxidize fatty acids, but the energy is not used to synthesize ATP.
- Peroxisomes are particularly abundant in plants.



Functions of Peroxisomes

- Catalyze a wide range of oxidation reactions.
- Oxidize fatty acids.
- Oxidases produce H_2O_2 and peroxidases such as **catalase** break it down.
- Peroxisomes are essential for cellular homeostasis.
- Patients who lack peroxisomes have severe neural defects.
- Genetic defects in peroxisomal biogenesis cause several forms of mental retardation.
- Peroxisomes also contain diverse enzymes for the metabolism of lipids and other metabolites, including the β -oxidation of fatty acids and oxidation of bile acids and cholesterol.
- Peroxisomes also may participate in aspects of cholesterol synthesis and metabolism.

Origin and Evolution

- The origins of peroxisomes are obscure. No nucleic acids or prokaryotic remnants have been detected in peroxisomes, so it seems unlikely that peroxisomes began as prokaryotic symbionts.
- Peroxisomes arose as centers for oxidative degradation, particularly of products of lysosomal digestion that could not be reutilized for biosynthesis (eg, D-amino acids, uric acid, xanthine).
- One possibility is that they evolved as a specialization of the ER.
- Peroxisomes are derived from the ER by a process that is distinct from the secretory pathway.

Lysosome vs Peroxisome

- Both have compartments. **Compartments** also protect the rest of the cell from potentially dangerous activities.
- Both have single membrane.
- Such as **degradative enzymes** in lysosomes and **oxidative enzymes** in peroxisomes.
- Lysosome is the part of **Endomembrane system** (i.e ER, Golgi , Lysosomes and vacuole are endomembrane system because their structure are different but their functions are coordinated) . Peroxisome is not the part of it.

Peroxisome Biogenesis

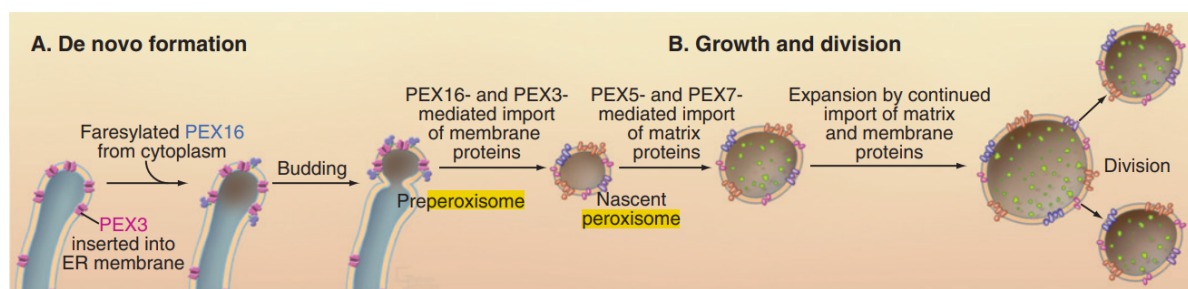


FIGURE 18.8 PEROXISOME BIOGENESIS. **A**, De novo formation by budding of a vesicle containing PEX3 and PEX16 from endoplasmic reticulum to form a **preperoxisome**. **B**, Growth and division of **peroxisomes**. PEX3 and PEX16 mediate the import of membrane proteins. The PEX5-PTS1 receptor, PEX7, and other peroxins mediate the import of proteins with PTS1 and PTS2 into **peroxisomes**.

- Peroxisomes, lipid droplets, and the Golgi apparatus all depend on the ER for their biogenesis and maintenance.
- Peroxisomal membranes form from lipids synthesized in the ER and proteins imported from the cytoplasm.
- The ER also supplies much of the lipid for the membranes of mitochondria and peroxisomes.
- Peroxisomal proteins are synthesized in the cytoplasm and imported into the organelle.
- Proteins called **peroxins** deliver proteins from the cytoplasm to the peroxisomal membrane or lumen.
- Peroxins: Proteins that deliver proteins to peroxisomes
- There are many peroxins ,namely PEX1,PEX2,PEX3 etc.
- The lipids are delivered in vesicles.
- Peroxisomes may arise by either of two pathways :
 1. De novo formation
 2. Growth and division.

MCQs

Question : The endomembrane system of a eukaryotic cell does not include:

1. Endoplasmic reticulum
2. Lysosome
3. Vacuole
4. Peroxisome

▼ Answer

4.Peroxisome

Question: Match List I with List II

List I	List II

A. Lysosome	I. Cisternae
B. Peroxisome	II. rRNA
C. Golgi apparatus	III. H ₂ O ₂
D. Nucleolus	IV. Suicide bag

Choose the correct answer from the options given below

1. A-(IV), B-(III), C-(I), D-(II)
2. A-(IV), B-(I), C-(III), D-(II)
3. A-(II), B-(I), C-(III), D-(IV)
4. A-(I), B-(II), C-(III), D-(IV)

▼ Answer

1.
